Peas to be cut for hay, and wheat to follow, and I want more than 20 bushels per acre next harvest.

ROTATING CROPS.

When I began farming, I tried a six-year rotation: cotton; cotton; corn and peas; wheat; clover; wheat followed by peas and then back to the beginning.

Experienced soon showed that a shorter rotation would suit my lands and pocket-book better, as clover so often failed me, throwing the whole system out of gear. I adopted a three-year rotation: cotton; corn; wheat. Of course catch crops are sown and the rotation is not iron clad. Some of my cotton lands are sown in crimson clover at the last working, while others are sown in rye at first or second picking. This clover and rye are turned for corn and peas, or peas only, for hay. The corn and pea lands go in wheat, rye or oats for grain, or oats and vetch for hay; all to be followed by a crop of peas for hay and part of the pea stubble to be sown in crimson clover, or vetch to be turned for cotton in the sprig. I try to get a full third of my arable uplands in cotton each year, for this is my money crop, while the wheat and corn lands are always divided with other crops.

A good pea hay crop will give as much feed as a corn crop and improve the land besides. By this management we sow peas at three different times each spring, and it does not interfere so much with the working of the crops. Just after the crops are planted, we turn our rye, prepare well and sow peas; then just before harvest and after the oats and vetch are mown, we turn and sow peas; after wheat harvest, peas are put in in a rush and work not so well done. Oats, vetch, and peas have solved the problem of hay; two heavy, sure crops each year. Why should I wait on red clover, when it has failed me so often? or depend on overflown creek bottoms?

FERTILIZERS AND MANURES

I have said scarcely any thing of stable manure, as none has been made on this farm except in bottom pasture.

I keep cattle, to be sure, but they are wintered on the home farm, and all the manure is needed there. This farm is worked entirely by tenants, for whom we furnish everything, and on time. There is not so much profit in this, but it is hard to get out of old ruts.

To show my appreciation of manure, I am now building a cow barn, on the Moore Farm, 54 x 110 feet, where cattle are to be fattened that I may have the use of the manure in building up my poor fields.

I sadly need more humus to let water in and hold it there. Decaying humus matter gives heat, and this, with humic acid and water, helps to set free plant food, as well as letting in air and keeping the soil in good mechanical condition.

Now a few words about commercial fertilizers. For some five years I have been mixing my own. I have made numerous tests on different crops and fields, and make my mixtures to correspond with these results. I always buy for cash the highest grade raw materials, and mix a high grade fertilizer.

This spring I bought 68 tons, all told, and the composition I top dressed my wheat and oats with was made as follows:

1,300 pounds, 16 per cent, acid phosphate.

500 pounds nitrate of soda.

200 pounds muriate of potash.

This would analyze 10¼ per cent phosphate acid, 4¾ per cent ammonia, 5 per cent potash, pure.

The cotton fertilizer that the most of the tenants used was made from

1,350 pounds acid phosphate.

250 pounds tankage.

200 pounds cotton-seed meal.

100 pounds nitrate of soda.

100 pounds muriate of potash.

Giving 11½ per cent phosphoric acid, 3 per cent ammonia, 2¾ per cent of potash.

Pea fertilizer has

1,800 pounds acid phosphate.

200 muriate potash.

And runs 14.4 per cent phosphoric acid and 5 per cent K2O.

Quite a number of mixtures are made and used every year. To this manipulation of fertilizers some of my neighbors attribute my success.

I pile them on renovating crops sometimes like some one was giving them to me, but I bank equally on manure, good preparation, selection of seed and thorough culture. For instance, I have selected my seed corn in the field for some five years, following our best authorities, and I see a wonderful improvement. It all looks like it had been planted just when the moon was right!

THE QUESTION OF LABOR.

"What's worth doing at all is worth doing right," has been a motto of mine. I want good heavy mules, good strong, large plows, and men who can handle them. A boy and the one-horse Dixie is a poor outfit to improve clay land with.

Four good big mules, a good driver, a sixteen-inch steel turn plow, and a good man to shake it well, will be more to my liking. After a crop is planted on thoroughly prepared soil the battle is half won. As I am not contented with a half-won victory, I insist on thorough, rapid culture, kept up until late in the season.

Never overtask hands with big crops. Keep them well up with their work, pay them promptly, keep them in good spirits and interested in their work. They are as proud of a good crop as you are.

Negro labor is the thing for our cotton farms. Make them happy by furnishing good quarters, good rations, prompt pay, and listen to them sing, and brag about your good crops.

I have taken hold of the plow handles myself that I might learn just where the difficulty lay. I have hunted up tools and placed them where needed to avoid loss of time in changing work. I want to be on the ground myself, no matter how good are the overseers I have.

EASY SCIENCE STUDIES FOR FARMERS.

XIX.—Plant and Soil Constituents.

Things in this world are divided into the Animal, Vegetable and Mineral Kingdoms. There is a great difference between a classic epic poem and a pebble. Yet the poem was made out of the rock. A man wrote the poem and he was made from the staff of life which grew in the soil made from the rocks. So the poet who said "books in the running brooks, tongues in trees, and sermons in stones," not only saw good in everything, but spoke the literal truth. Of course, one element was added in the plant—Life, which is a state rather than a thing, and the animal received a brain, man a soul and the poet genius, of all which, science in its material department has little to do, but, in its last analysis, has everything to do.

In considering the constituents of plants we find on analysis that while plants are organic, they are composed of inorganic materials. The nitrogen and potash and sulphur found in plants are identical with the nitrogen, potash and sulphur in the soil. As we have said in these studies, the soil is composed of a great variety of minerals; so, also, do plants require for their growth many of those elements.

It is a remarkable fact that the constituents most plentiful in soil are used in the least quantities by vegetation, while those elements which plants demand in abundance are found in smallest proportion in the soil. This is the basis of all our talk about Nitrogen, Phosphorus and Potash. It seems to be a subversion of nature's economy, but in reality it is a wise provision.

The chief constituent of plants is water. Lettuce and turnips contain over 90 per cent; growing timber seldom contains less than 40 per cent.

Plants are composed of three kinds of elements, and they may be determined by the heat test. If a plant is thoroughly dried by heat all that weight which disappears in steam is water. If the plant is burned a very large part passes away in the form of gas, but there is left a small quantity of white ash.

The combustible part of plants is made up of six chemical constituents —carbon, oxygen, hydrogen, nitrogen and sulphur with a little phosphorus—and without these no plant was ever produced. Carbon generally forms about one-half of the dry, combustible matter of plants. Nitrogen seldom exceeds 4 per cent, generally much less; sulphur and phosphorous are still smaller in quantity. The remainder is oxygen and hydrogen.

The incombustible ash also contains six elements—potash, magnesia, lime, iron, phosphorus and sulphur. These six, though forming a very small portion, are indispensable to the plant's existence. Sometimes other elements are found, as silicon, chlorine and sodium.

The water in plants is supplied through the roots from the moisture in the soil, with rain as its original source. Carbon comes from the carbonic acid gas in the atmosphere. Hydrogen and oxygen are elaborated from water. Nitrogen must come from organic material in the soil or in the case of leguminous plants from the air through the office of bacterial nodules. All the rest are mineral and are either found naturally in the soil or are supplied in the form of fertilizers.

In the following table will be found the average composition of a crop of meadow grass weighing over five tons when cut green and making when dried one and a half tons of hay:

Composition of a crop of meadow grass:

Water		8,378 lbs
Carbon	1315	
Hydrogen	144	
Nitrogen	49	
Oxygen and sulphur	1105	
Combustible matter		2,613 lbs
Potash	56.3	
Soda	11.9	
Lime	28.1	
Magnesia	10.1	
Iron	.9	
Phosphorus	12.7	
Sulphur	10.8	
Clorine	16.2	
Silica	57.5	
Sand, etc.	4.5	
Ash		209 lbs
Total crop		11,200 lbs

This may not seem to be an "easy" study to some, but while some of the terms used above may be little understood and in practical life unnecessary, farmers are familiarizing themselves more and more with scientific language and thought. At any Farmers' Institute you may hear rugged old farmers rattle off questions about protein and carbohydrates and when you once understand that these simple elements, with a few more in rare proportions, make up the material universe, you begin to see the importance of becoming acquainted with the most common.

The practical farmer need not bother himself with any of these minerals, except those which are scarce and which he is using up at so rapid a rate in his crops. These are the Big Three—Nitrogen, Phosphoric Acid and Potash. Chapter 10 on "Availability" showed what a very small proportion of these elements are found in the soil.

When American farmers realize fully the significance of these proportions and get away from the notion that the soil is the widow's curse from which earth's bounty may be poured forever, a new era will dawn upon American agriculture.—H. A. Bereman, in Colman's Rural World.

An interesting bulletin on squab raising has just been issued by the Bureau of Animal Industry, known as Farmers' Bulletin No. 177. The breeds recommended for market raising are Homers or a cross between them and Dragoons. Successful breeders use Homers almost exclusively. The author of the bulletin, William E. Rice, has 425 pairs of pigeons which produced last year 4,400 squabs for market.